



Hydrogeologic Investigation of the Superstition Vistas Planning Area

Presented to Phoenix AMA
Groundwater Users Advisory Council
September 14, 2017



Study Team/Acknowledgments

- Arizona Department of Water Resources (ADWR)
 - ADWR Water Management Assistance Program
 - Groundwater Users Advisory Council
- Arizona State Land Department (ASLD)
- Arizona Water Company (AWC)
- U.S. Bureau of Reclamation (USBR)
- Resolution Copper
- Salt River Project (SRP)
 - Arizona Geological Survey
 - University of Arizona Seismic Group
 - Arizona State University and Steve Skotnicki
 - ADOT Materials Group



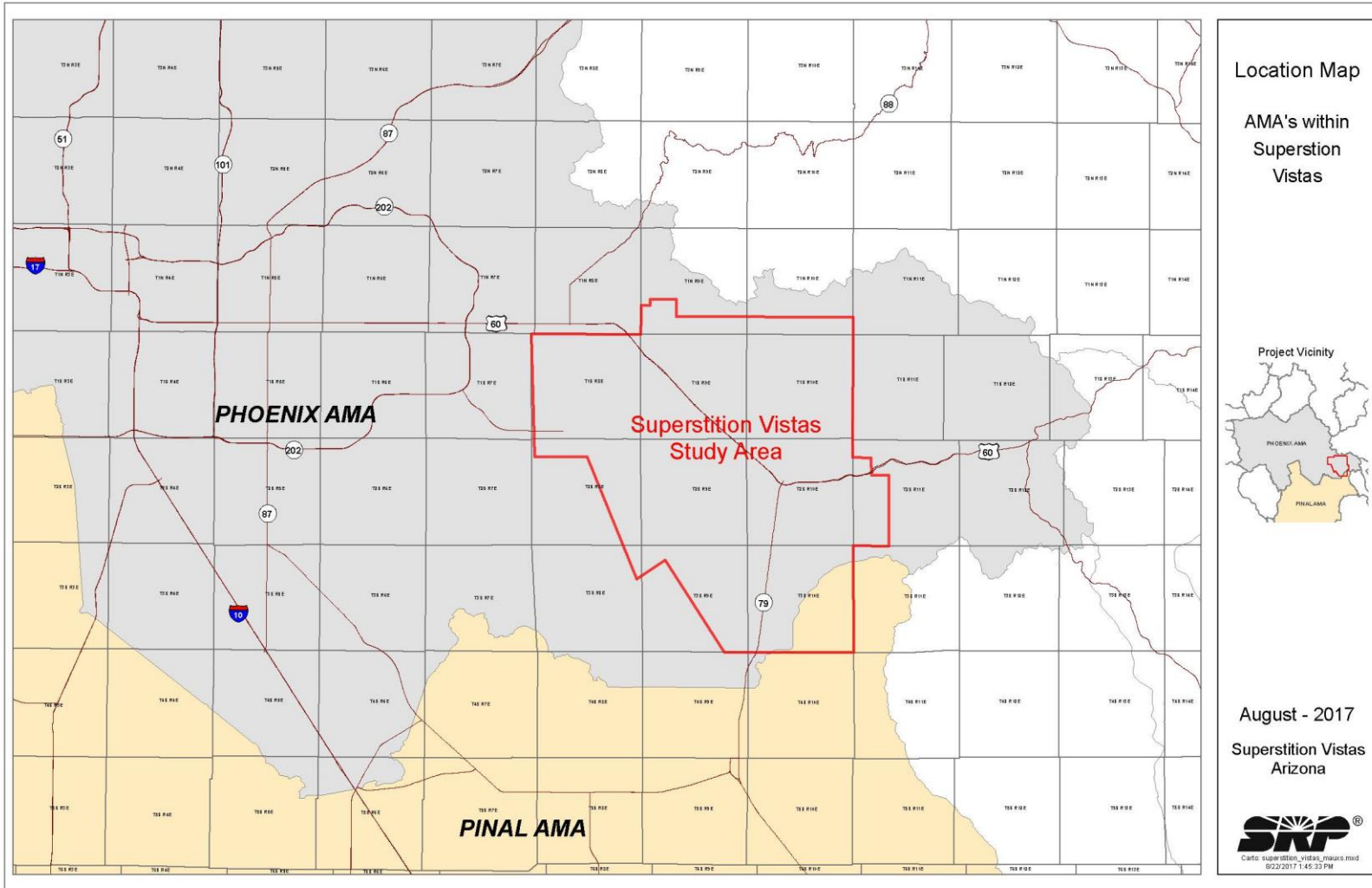
Study Purpose

Monitor and assess the water availability of the far southeastern region of the Phoenix Active Management Area (AMA)





Location Map





Impacts/Benefits

- Refine conceptual site model to support any future groundwater modeling activities
- Guide stakeholders in planning efforts to develop a sustainable water supply strategy



Background

- Regional Studies
 - Seismic exploration 1970s/ 1980s
 - US BOR 1977 Salt-Gila Wells
 - USGS Laney and Hahn, 1986
 - ADWR Corkhill, 1993
 - AZGS Geology Mapping 1990s;
 - AZGS, UA, ADWR 2006-08; Warren 2009
 - Resolution Copper 2012-14
 - AZGS Westcarb, 2013
- Superstition Vistas Study Team 2013-2017
 - Preliminary Investigation (Phase I) 2013-14
 - Detailed hydrogeologic investigation (Phase II) 2015-17



Phase II Objectives

- Improve geologic interpretation (i.e. depth to bedrock) to better define the basin structure and aquifer extent
- Better delineate thickness of hydrogeological units (UAU, MAU, LAU), consistent with those in ADWR SRV Model
- Fill in data gaps with respect to water levels and aquifer characteristics to further characterize the groundwater system

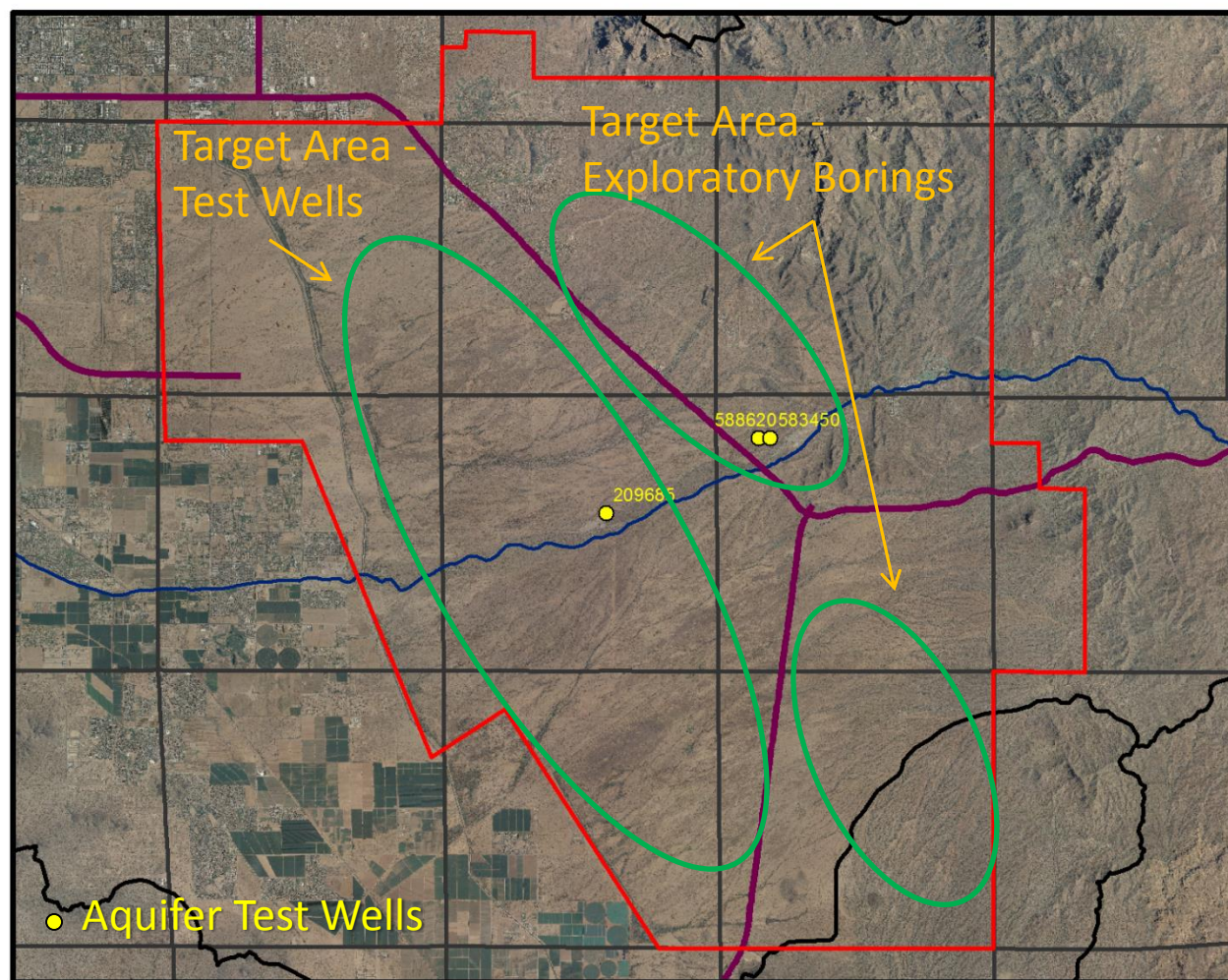


Phase II Tasks

- 1) Aquifer testing of 2 AWC wells and 1 ASLD well (SRP, ASLD, AWC)
- 2) Siting evaluation (AZGS, UA, and Technical Working Group); Site Access (ASLD)
- 3) Drilling of five (5) exploratory borings up to 1500 feet below ground surface and installation and testing of one (1) test well (SRP oversight)
- 4) Borehole and downhole geophysical data collection and detailed analysis (AZGS, Skotnicki, SRP)
- 5) Analysis of vintage seismic data, calibrated to borehole and geophysical data (UA Seismic Group; AZGS)
- 6) Geological Interpretation, with delineation of depth to bedrock and hydrogeologic unit contacts – Updated Cross Sections (AZGS, UA)
- 7) Reporting



Focus Areas





Key Findings

- Depth to bedrock and saturated thickness were significantly increased
- A piedmont between Hawk Rock and Florence Junction was identified from newly calibrated seismic data; averages 400 to 1,000 feet thick.
- Three new mineral sedimentary facies identified.
- Primary aquifer – lower alluvial unit (LAU).
- Water quality testing suggests overall good water quality within the Superstition Vistas Planning Area.



Summary of Exploratory Drilling

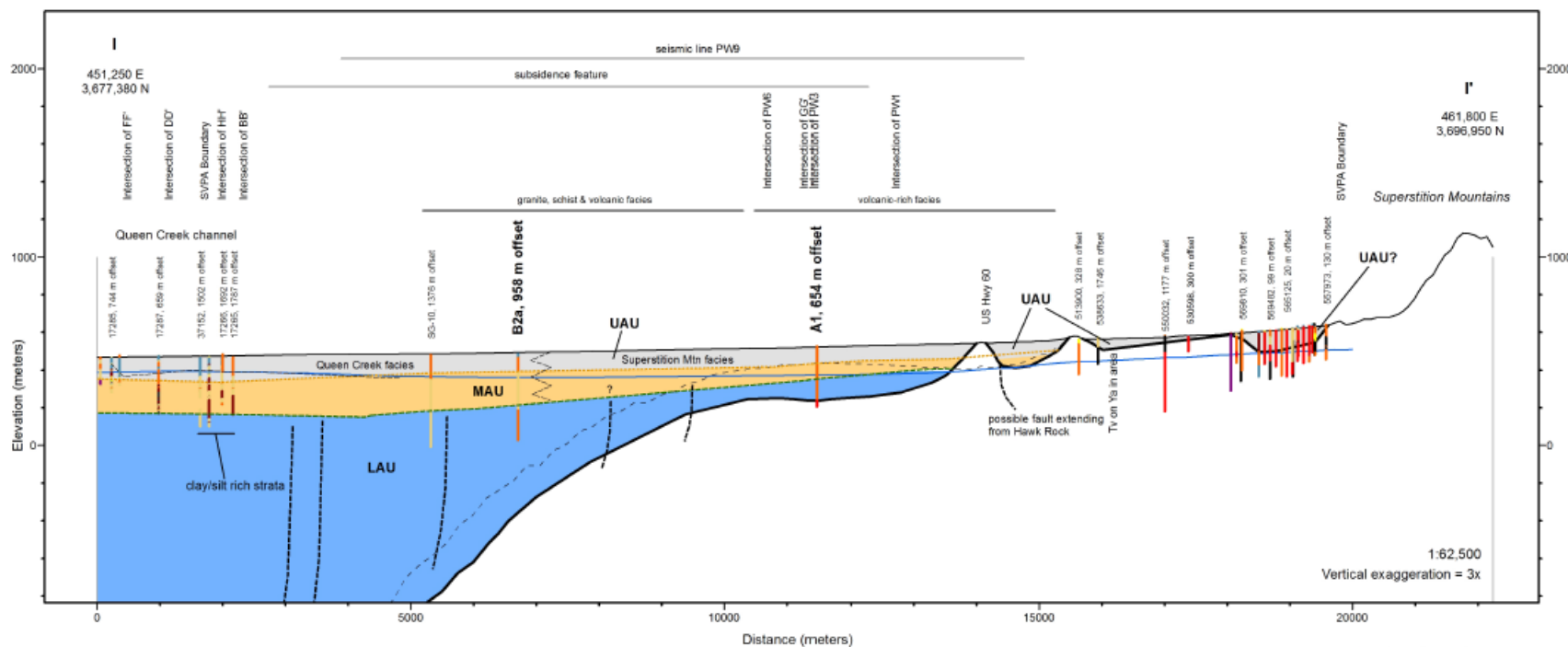
Boring #	Drilled Depth (ft)	Old Depth to Bedrock (ft)	Revised Depth to Bedrock (ft)	Change in Depth to Bedrock (ft)	Depth to Water (ft)
A1	1045	300	946	+646	540
A2	824	200	588	+388	320
C1	1540	750	1455	+705	660
C3a	941	1400	3000-3200	+1600-1800	523
A3a	1500	2800	3500-4000	+700-1200	488
B2a	1500	2000	2700-3000	+700-1000	448



NE-SW Section – Piedmont Area

Hydrogeologic Cross Section I-I'

Superstition Vistas Planning Area



Hydrogeologic contacts/other

- Depth to water (2017)
- Bottom of UAU
- Bottom of MAU
- Depth to bedrock (2017)
- Depth to bedrock (2012)

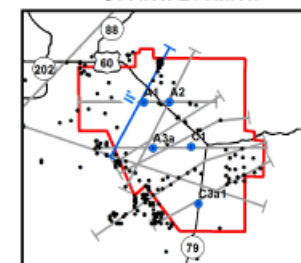
Hydrogeologic units

- Upper Alluvial Unit
- Middle Alluvial Unit
- Lower Alluvial Unit

Borehole lithology

- Predominantly gravelly sediments
- Predominantly sand and gravel
- Predominantly silt and clay
- Predominantly clayey sediments
- Predominantly conglomeratic sediments
- Evaporite or evaporitic sediments
- Basalt flows or vents
- Felsic/intermediate volcanic rocks
- Crystalline bedrock (igneous or metamorphic)
- Unknown rock or sediment

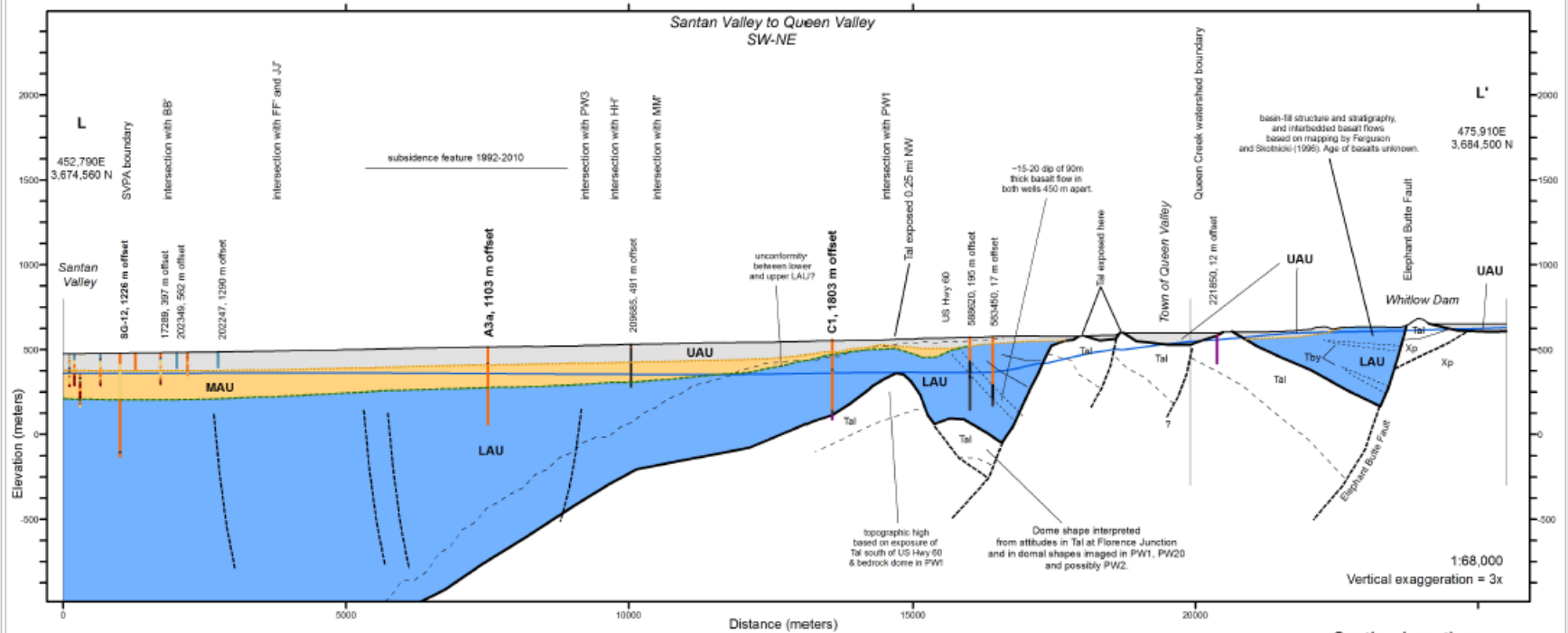
Section Location



NE-SW Section – Queen Creek

Hydrogeologic Cross Section L-L'

Superstition Vistas Planning Area



Hydrogeologic contacts/other

Hydrogeologic units

Borehole lithology

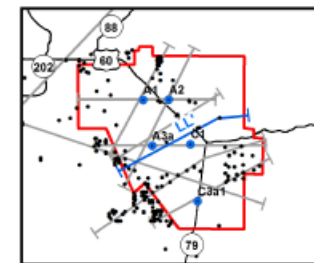
- Depth to water (2017)
- Bottom of UAU
- Bottom of MAU
- Depth to bedrock (2017)
- Depth to bedrock (2012)

- Upper Alluvial Unit
- Middle Alluvial Unit
- Lower Alluvial Unit

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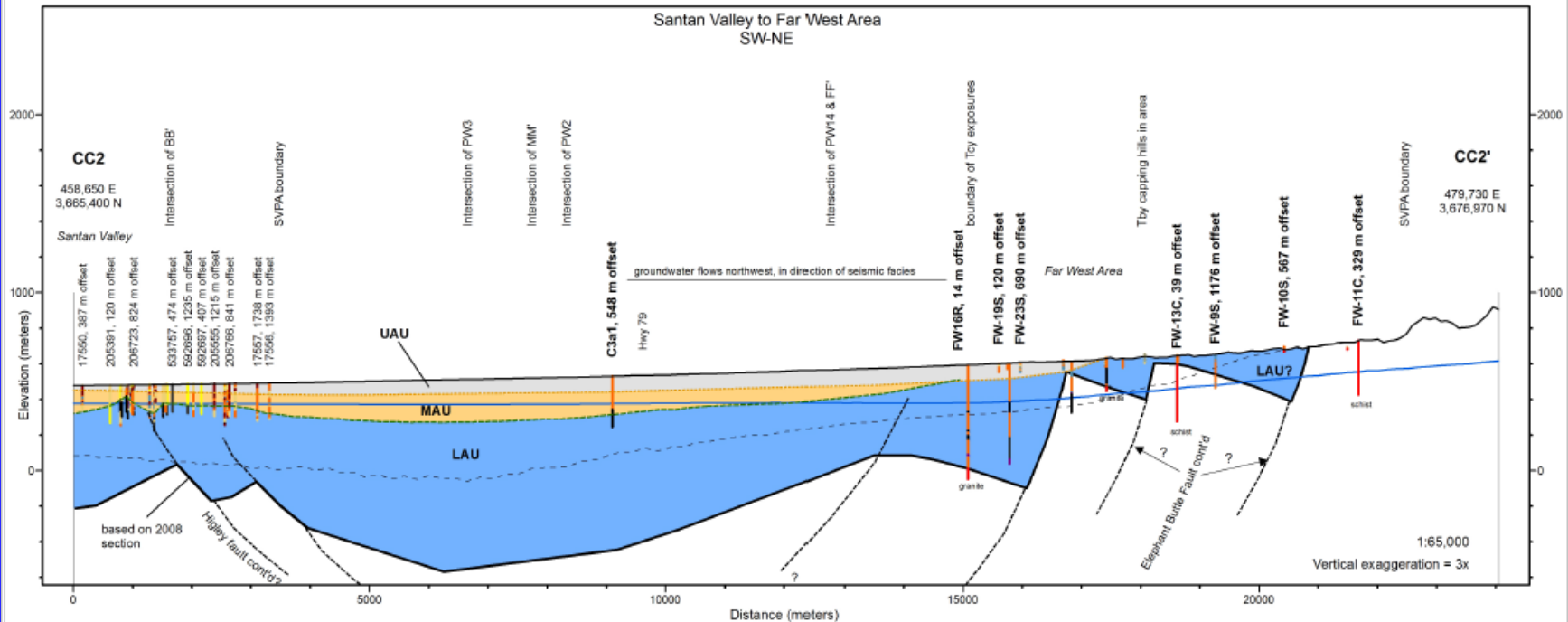
Section Location



NE-SW Section - Southern Area

Hydrogeologic Cross Section CC2-CC2'

Superstition Vistas Planning Area



Hydrogeologic contacts/other

- Depth to water (2017)
- Bottom of UAU
- Bottom of MAU
- Depth to bedrock (2017)
- Depth to bedrock (2012)

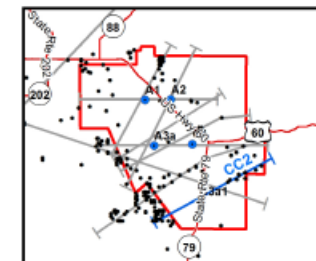
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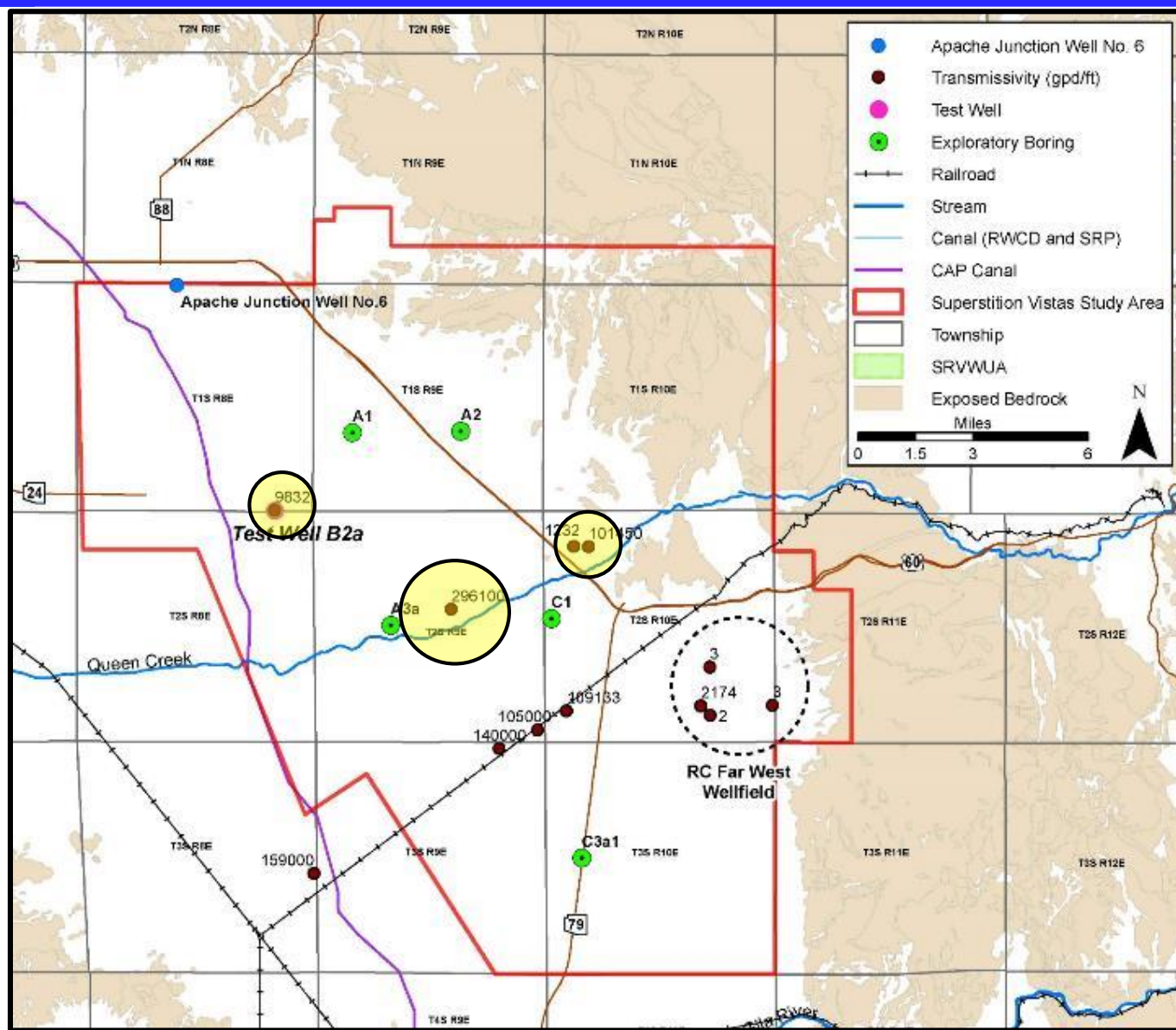
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Section Location





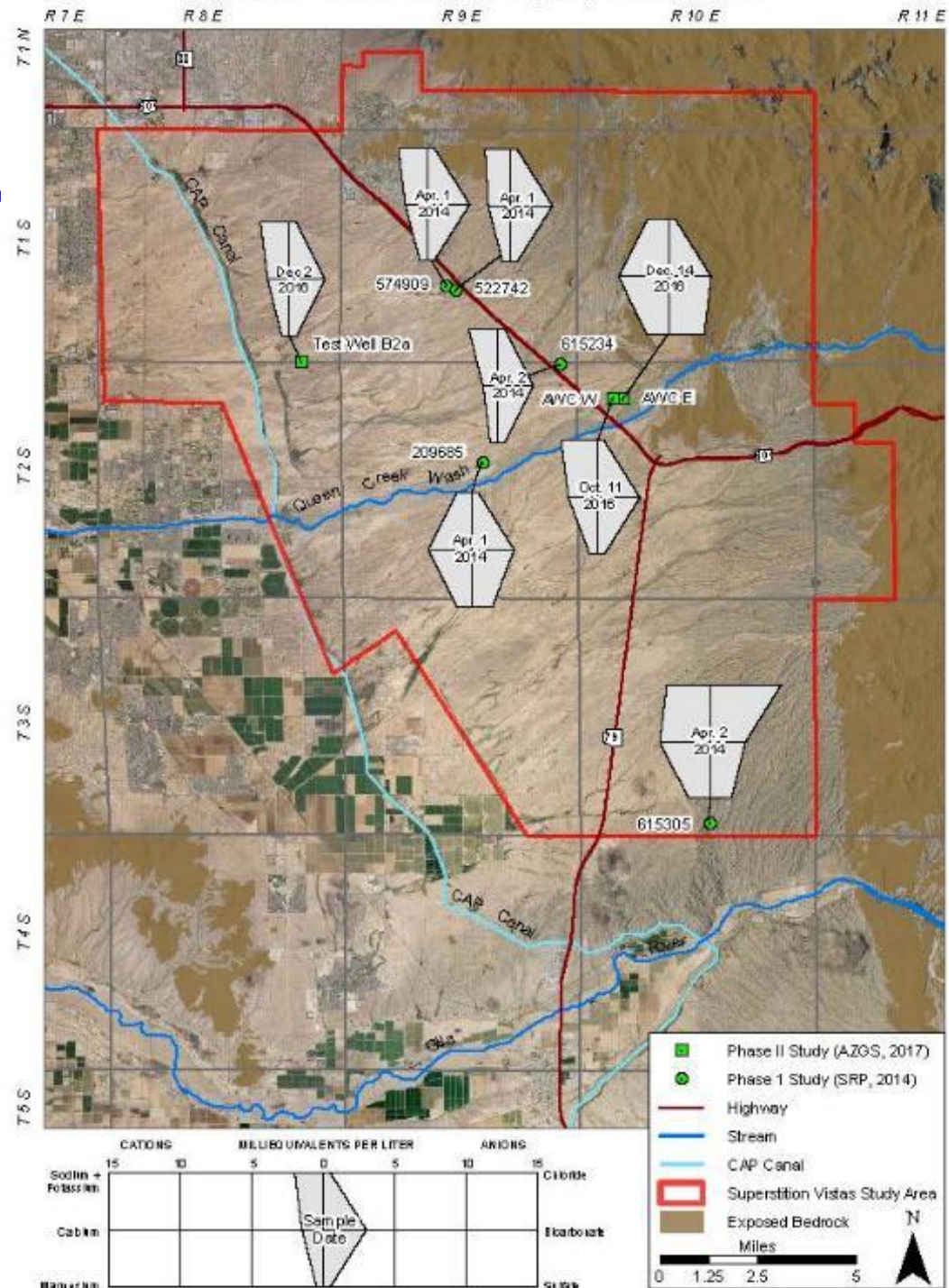
Aquifer Testing Results





Groundwater Chemistry

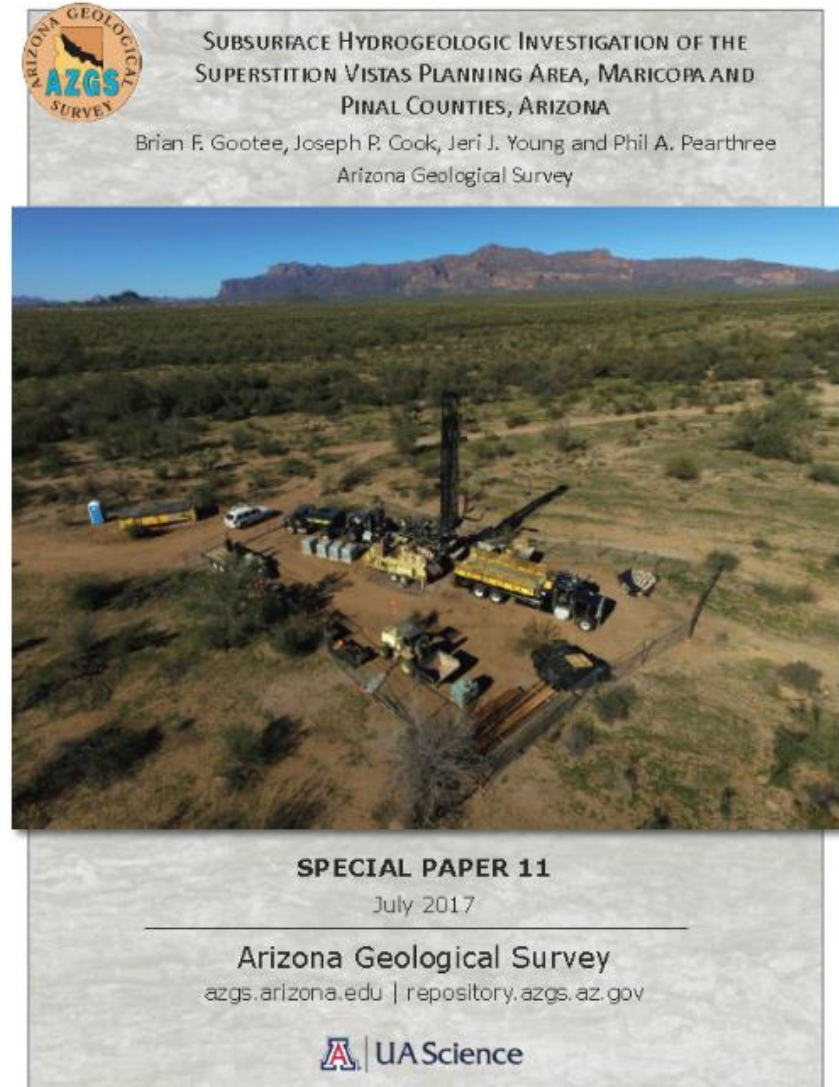
- Phase 1 and II sampling
 - Total dissolved solids generally < 500 mg/l
 - Nitrate-N < 3 mg/l
 - Arsenic $\sim < 8$ ug/l
- Different recharge sources and flow paths suggested





Reporting: AZGS Special Paper 11

- Released July 24, 2017 on AZGS Document Repository
- Report
- 2 plates
- 10 appendices
- GIS files





Phase II Cost Summary

Task	Description	Cost
Pre-Field Activities	Site Access, Permitting	In-Kind Services ¹
1	Aquifer Testing	In-Kind Services ²
2-7	Drilling/New Well Installation and Testing Data Analysis/Reporting	~\$1,300,000 ^{3,4}

Notes:

¹ ASLD and SRP

² AWC, SRP, and ASLD

³ Financial Contributions: SRP, ADWR Water Management Assistance Program, and Resolution Copper.

⁴ In-kind services of the Technical Working Group



Next Steps

1. Work with ADWR on updating the Salt River Valley Groundwater Model to reflect Phase II data collection in SVPA.



Questions?